I CLAIM:

1. A current limiting fusible module, for use in a cryogenic fuse, said fusible module being adapted to initiate a current limiting arc, said fusible module comprising:

    a first cryogenic composite;

    a second cryogenic composite, adjacent to said first cryogenic composite;

    wherein at least one of said first and said second cryogenic composites has a non-linear and substantially increasing resistivity with respect to increasing at least one of temperature and current, further wherein one of said first and second cryogenic composites having the highest resistance will depart from its solid state thereby initiating said current limiting arc.

2. The current limiting fusible module as claimed in claim 1, further comprising a cryogenic heat dissipater secured to both the first cryogenic composite and the second cryogenic composite, said cryogenic heat dissipater adjacent each other and dissipating heat to thereby increase nominal operating current without significantly increasing peak fault current and let-through energy of said current fusible module.

3. A current limiting fusible module as claimed in claim 1, further comprising one of said first and second cryogenic composite having the highest resistance and

two of the other cryogenic composite disposed on either side thereof.

4. A current limiting fusible module as claimed in claim 2, further comprising one of said first and second cryogenic composite having the highest resistance and two of the other cryogenic composite disposed on either side thereof.

5. A fusible element, for use in a cryogenic fuse, said fusible element being adapted to initiate a current limiting arc, said fusible element comprising:

a plurality of a first cryogenic composite;

a plurality of a second cryogenic composite, each of said plurality of said second cryogenic composite being adjacent to one of said plurality of said first cryogenic composite to thereby create a plurality of current limiting fusible modules;

wherein at least one of said first and said second cryogenic composites has a non-linear and substantially increasing resistivity with respect to increasing at least one of temperature and current, further wherein one of said first and second cryogenic composites having the highest resistance will depart from its solid state thereby initiating said current limiting arc.

6. The fusible element as claimed in claim 5, wherein said pluralities of first and second cryogenic composites form a series having two ends, wherein the one of said first and second cryogenic composite

having the lowest resistance when said current limiting arc is initiated forms said ends.

7. The fusible element as claimed in claim 6, wherein at least two of said plurality of current limiting fusible modules are secured serially one to another according to a desired power nominal and fault voltage.

8. The fusible element as claimed in claim 6, wherein at least two current limiting fusible modules are secured in parallel in accordance with a desired power network nominal and fault current.

9. The fusible element as claimed in claim 5, further comprising a plurality of cryogenic heat dissipaters, each of said plurality of cryogenic heat dissipaters being secured to one of said plurality of said first cryogenic composite and one of said plurality of said second cryogenic composite, each of said plurality of cryogenic heat dissipaters being adapted to dissipate heat to thereby increase nominal operating current without significantly increasing a peak fault current and a let-through energy of said fusible element.

10. The fusible element as claimed in claim 9, wherein said pluralities of first and second cryogenic composites form a series having two ends, wherein the one of said first and second cryogenic composite having the lowest resistance when said current limiting arc is initiated forms said ends.

11. The fusible element as claimed in claim 9, wherein at least two of said plurality of current limiting

fusible modules are secured serially one to another according to a desired power nominal and fault voltage.

12. The fusible element as claimed in claim 9, wherein at least two current limiting fusible modules are secured in parallel in accordance with a desired power network nominal and fault current.

13. A cryogenic fuse adapted to initiate a current limiting arc, said cryogenic fuse comprising:

a casing;

a plurality of a first cryogenic composite within said casing;

a plurality of a second cryogenic composite within said casing, each of said plurality of said second cryogenic composite being adjacent to one of said plurality of said first cryogenic composite to thereby create a plurality of current limiting fusible modules;

a cooling means within said casing, said cooling means surrounding said plurality of said first cryogenic composite and said plurality of said second cryogenic composite;

an arc-extinguishing medium, within said casing; and

wherein at least one of said first and said second cryogenic composites has a non-linear and substantially increasing resistivity with respect to increasing at least one of temperature and current, further wherein one

of said first and second cryogenic composites having the highest resistance will depart from its solid state thereby initiating said current limiting arc.

14. The cryogenic fuse as claimed in claim 13, wherein said cooling means comprises a coolant liquid.

15. The cryogenic fuse as claimed in claim 14, wherein said coolant liquid comprises liquid nitrogen.

16. The cryogenic fuse as claimed in claim 13, wherein said cooling means comprises a cryocooler thermally connected to said plurality of said first cryogenic composite and said plurality of said second cryogenic composite, further wherein said casing comprises a cryogenic insulation material surrounding said plurality of said first cryogenic composite and said plurality of said second cryogenic composite.

17. The cryogenic fuse as claimed in claim 13, wherein said cooling means comprises at least one Peltier module thermally connected to said plurality of said first cryogenic composite and said plurality of said second cryogenic composite, further wherein said casing comprises a cryogenic insulation material surrounding said plurality of said first cryogenic composite and said plurality of said second cryogenic composite.

18. The cryogenic fuse as claimed in claim 13, further comprising a plurality of cryogenic heat dissipaters, each of said plurality of cryogenic heat dissipaters being secured to at least one of said plurality of

said first cryogenic composite and at least one of said plurality of said second cryogenic composite, each of said plurality of cryogenic heat dissipaters being adapted to dissipate heat to thereby increase nominal operating current without significantly increasing peak fault current and let-through energy of said fusible element.

19. The cryogenic fuse as claimed in claim 18, wherein said cooling means comprises a coolant liquid.

20. The cryogenic fuse as claimed in claim 19, wherein said coolant liquid comprises liquid nitrogen.

21. The cryogenic fuse as claimed in claim 18, wherein said cooling means comprises a cryocooler thermally connected to said plurality of said first cryogenic composite and said plurality of said second cryogenic composite, further wherein said casing comprises a cryogenic insulation material surrounding said plurality of said first cryogenic composite and said plurality of said second cryogenic composite.

22. The cryogenic fuse as claimed in claim 18, wherein said cooling means comprises at least one Peltier module thermally connected to said plurality of said first cryogenic composite and said plurality of said second cryogenic composite, further wherein said casing comprises a cryogenic insulation material surrounding said plurality of said first cryogenic composite and said plurality of said second cryogenic composite.

23. A method for manufacturing a cryogenic fuse, comprising:

creating a plurality of current limiting fusible modules, each one of said plurality of current limiting fusible modules being adapted to initiate a current limiting arc, said current limiting fusible module comprising a first cryogenic composite and a second cryogenic composite adjacent to said first cryogenic composite, wherein at least one of said first and said second cryogenic composites has a non-linear and substantially increasing resistivity with respect to increasing at least one of temperature and current, further wherein one of said first and second cryogenic composites having the highest resistance will depart from its solid state thereby initiating said current limiting arc;

creating at least one fusible assembly by placing at least one of said plurality of current limiting fusible modules serially according to a desired power network nominal voltage;

creating a fusible element by assembling said at least one fusible assembly of said at least one fusible assembly in parallel according to a desired power network nominal current; and

incorporating said fusible element in a casing comprising an arc-extinguishing medium and means for cryogenic cooling thereby creating said cryogenic fuse.

24. The method as claimed in claim 23, wherein said means for cryogenic cooling comprises at least one of a Peltier module and a cryocooler module.

25. The method as claimed in claim 23, wherein said creating of said plurality of current limiting fusible modules further comprises securing a cryogenic heat dissipator to both said first cryogenic composite and said second cryogenic composite, said cryogenic heat dissipator dissipating heat to increase the nominal current and over-current characteristics without significantly increasing the peak limited current and let-through energy.

26. The method as claimed in claim 25, wherein said means for cryogenic cooling comprises at least one of a Peltier module and a cryocooler module.

27. The method as claimed in claim 23, wherein said creating of said plurality of current limiting fusible modules, said creating of said at least one fusible assembly and said creating of said fusible element are performed using a layer manufacturing technique.

28. The method as claimed in claim 27, wherein said creating of said plurality of current limiting fusible modules further comprises securing a cryogenic heat dissipater to both said first cryogenic composite and said second cryogenic composite, said cryogenic heat dissipater dissipating heat to increase the nominal current and over-current characteristics without significantly increasing the peak limited current and let-through energy.

29. The method as claimed in claim 28, wherein said means for cryogenic cooling comprises at least one of a Peltier module and a cryocooler module.